

## Definitions of Ecosystem Services, Version 2

Service	Sub-category	Definition	Examples
<b>Provisioning services: The goods or products obtained from ecosystems</b>			
<b>Food</b>	Crops	Cultivated plants or agricultural produce harvested by people for human or animal consumption as food	<ul style="list-style-type: none"> <li>• Grains</li> <li>• Vegetables</li> <li>• Fruits</li> </ul>
	Livestock	Animals raised for domestic or commercial consumption or use	<ul style="list-style-type: none"> <li>• Chicken</li> <li>• Pigs</li> <li>• Cattle</li> </ul>
	Capture fisheries	Wild fish captured through trawling and other non-farming methods	<ul style="list-style-type: none"> <li>• Cod</li> <li>• Crabs</li> <li>• Tuna</li> </ul>
	Aquaculture	Fish, shellfish, and/or plants that are bred and reared in ponds, enclosures, and other forms of freshwater or saltwater confinement for purposes of harvesting	<ul style="list-style-type: none"> <li>• Shrimp</li> <li>• Oysters</li> <li>• Salmon</li> </ul>
	Wild foods	Edible plant and animal species gathered or captured in the wild	<ul style="list-style-type: none"> <li>• Fruits and nuts</li> <li>• Fungi</li> <li>• Bushmeat</li> </ul>
<b>Biological raw materials</b>	Timber and other wood products	Products made from trees harvested from natural forest ecosystems, plantations, or non-forested lands	<ul style="list-style-type: none"> <li>• Industrial roundwood</li> <li>• Wood pulp</li> <li>• Paper</li> </ul>
	Fibers and resins	Non-wood and non-fuel fibers and resins	<ul style="list-style-type: none"> <li>• Cotton, silk, hemp</li> <li>• Twine, rope</li> <li>• Natural rubber</li> </ul>
	Animal skins	Processed skins of cattle, deer, pig, snakes, sting rays, or other animals	<ul style="list-style-type: none"> <li>• Leather, rawhide, cordwain</li> </ul>
	Sand	Sand formed from coral and shells	<ul style="list-style-type: none"> <li>• White sand from coral and white shells</li> <li>• Colored sand from shells</li> </ul>
	Ornamental resources	Products derived from ecosystems that serve aesthetic purposes	<ul style="list-style-type: none"> <li>• Tagua nut, wild flowers, coral jewelry</li> </ul>
<b>Biomass fuel</b>		Biological material derived from living or recently living organisms—both plant and animal—that serves as a source of energy	<ul style="list-style-type: none"> <li>• Fuelwood and charcoal</li> <li>• Grain for ethanol production</li> <li>• Dung</li> </ul>
<b>Freshwater</b>		Inland bodies of water, groundwater, rainwater, and surface waters for household, industrial, and agricultural uses	<ul style="list-style-type: none"> <li>• Freshwater for drinking, cleaning, cooling, industrial processes, electricity generation, or mode of transportation</li> </ul>
<b>Genetic resources</b>		Genes and genetic information used for animal breeding, plant improvement, and biotechnology	<ul style="list-style-type: none"> <li>• Genes used to increase crop resistance to disease or pests</li> </ul>
<b>Biochemicals, natural medicines, and pharmaceuticals</b>		Medicines, biocides, food additives, and other biological materials derived from ecosystem for commercial or domestic use	<ul style="list-style-type: none"> <li>• Echinacea, ginseng, garlic</li> <li>• Paclitaxel as basis for cancer drugs</li> <li>• Tree extracts used for pest control</li> </ul>
<b>Regulating services: The benefits obtained from an ecosystem's control of natural processes</b>			
<b>Maintenance of air quality</b>		Influence ecosystems have on air quality by emitting chemicals to the atmosphere (i.e., serving as a "source") or extracting chemicals from the atmosphere (i.e., serving as a "sink")	<ul style="list-style-type: none"> <li>• Lakes serve as a sink for industrial emissions of sulfur compounds</li> <li>• Tree and shrub leaves trap air pollutants near roadways</li> </ul>
<b>Regulation of climate</b>	Global	Influence ecosystems have on the global climate by emitting greenhouse gases or aerosols to the atmosphere or by absorbing greenhouse gases or aerosols from the atmosphere	<ul style="list-style-type: none"> <li>• Forests capture and store carbon dioxide</li> <li>• Cattle and rice paddies emit methane</li> </ul>
	Regional and local	Influence ecosystems have on local or regional temperature, precipitation, and other climatic factors	<ul style="list-style-type: none"> <li>• Forests can impact regional rainfall levels</li> </ul>
<b>Regulation of water timing and flows</b>		Influence ecosystems have on the timing and magnitude of water runoff, flooding, and aquifer recharge, particularly in terms of the water storage potential of the ecosystem or landscape	<ul style="list-style-type: none"> <li>• Permeable soil facilitates aquifer recharge</li> <li>• River floodplains and wetlands retain water—which can decrease flooding—reducing the need for engineered flood control infrastructure</li> </ul>

## Definitions of Ecosystem Services, Version 2 (continued)

Service	Definition	Examples
<b>Regulating services (continued)</b>		
<b>Erosion control</b>	Role ecosystems play in retaining and replenishing soil and sand deposits	<ul style="list-style-type: none"> <li>Vegetation such as grass and trees prevents soil loss due to wind and rain and prevents siltation of water ways</li> <li>Coral reefs, oyster reefs, and sea grass beds reduce loss of land and beaches due to waves and storms</li> </ul>
<b>Water purification and waste treatment</b>	Role ecosystems play in the filtration and decomposition of organic wastes and pollutants in water; assimilation and detoxification of compounds through soil and subsoil processes	<ul style="list-style-type: none"> <li>Wetlands remove harmful pollutants from water by trapping metals and organic materials</li> <li>Soil microbes degrade organic waste, rendering it less harmful</li> </ul>
<b>Disease mitigation</b>	Influence that ecosystems have on the incidence and abundance of human pathogens	<ul style="list-style-type: none"> <li>Some intact forests reduce the occurrence of standing water—a breeding area for mosquitoes—which lowers the prevalence of malaria</li> </ul>
<b>Maintenance of soil quality</b>	Role ecosystems play in sustaining soil's biological activity, diversity and productivity; regulating and partitioning water and solute flow; storing and recycling nutrients and gases; among other functions	<ul style="list-style-type: none"> <li>Some organisms aid in decomposition of organic matter, increasing soil nutrient levels</li> <li>Some organisms aerate soil, improve soil chemistry, and increase moisture retention</li> </ul>
<b>Pest mitigation</b>	Influence ecosystems have on the prevalence of crop and livestock pests and diseases	<ul style="list-style-type: none"> <li>Predators from nearby forests—such as bats, toads, and snakes—consume crop pests</li> </ul>
<b>Pollination</b>	Role ecosystems play in transferring pollen from male to female flower parts	<ul style="list-style-type: none"> <li>Bees from nearby forests pollinate crops</li> </ul>
<b>Natural hazard mitigation</b>	Capacity for ecosystems to reduce the damage caused by natural disasters such as hurricanes and tsunamis and to maintain natural fire frequency and intensity	<ul style="list-style-type: none"> <li>Mangrove forests and coral reefs protect coastlines from storm surges</li> <li>Biological decomposition processes reduce potential fuel for wildfires</li> </ul>
<b>Cultural services: The nonmaterial benefits obtained from ecosystems</b>		
<b>Recreation and ecotourism</b>	Recreational pleasure people derive from natural or cultivated ecosystems	<ul style="list-style-type: none"> <li>Hiking, camping, and bird watching</li> <li>Going on safari</li> <li>Scuba diving</li> </ul>
<b>Ethical and spiritual values</b>	Spiritual, religious, aesthetic, intrinsic, “existence,” or similar values people attach to ecosystems, landscapes, or species	<ul style="list-style-type: none"> <li>Spiritual fulfillment derived from sacred lands and rivers</li> <li>People's desire to protect endangered species and rare habitats</li> </ul>
<b>Educational and inspirational values</b>	Information derived from ecosystems used for intellectual development, culture, art, design, and innovation	<ul style="list-style-type: none"> <li>The structure of tree leaves has inspired technological improvements in solar power cells</li> <li>School fieldtrips to nature preserves aid in teaching scientific concepts and research skills</li> </ul>
<b>Supporting services: The natural processes that maintain the other ecosystem services</b>		
<b>Habitat</b>	Natural or semi-natural spaces that maintain species populations and protect the capacity of ecological communities to recover from disturbances	<ul style="list-style-type: none"> <li>Native plant communities often provide pollinators with food and structure for reproduction</li> <li>Rivers and estuaries provide nurseries for fish reproduction and juvenile development</li> <li>Large natural areas and biological corridors allow animals to survive forest fires and other disturbances</li> </ul>
<b>Nutrient cycling</b>	Flow of nutrients (e.g., nitrogen, sulfur, phosphorus, carbon) through ecosystems	<ul style="list-style-type: none"> <li>Transfer of nitrogen from plants to soil, from soil to oceans, from oceans to the atmosphere, and from the atmosphere to plants</li> </ul>
<b>Primary production</b>	Formation of biological material by plants through photosynthesis and nutrient assimilation	<ul style="list-style-type: none"> <li>Algae transform sunlight and nutrients into biomass, thereby forming the base of the food chain in aquatic ecosystems</li> </ul>
<b>Water cycling</b>	Flow of water through ecosystems in its solid, liquid, or gaseous forms	<ul style="list-style-type: none"> <li>Transfer of water from soil to plants, plants to air, and air to rain</li> </ul>

**Source:** Adapted by the World Resources Institute from the reports of the Millennium Ecosystem Assessment, 2005; The Cost of Policy Inaction, 2008; The Corporate Ecosystem Services Review, 2008; The Economics of Ecosystems and Biodiversity, 2010.

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